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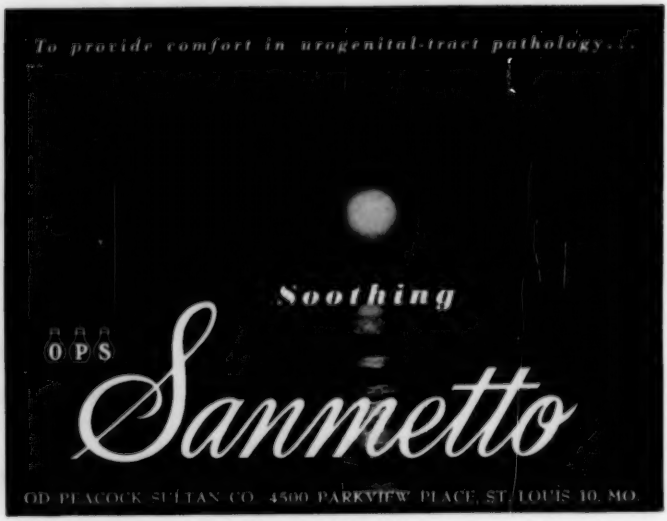
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Some Facts About Genetics of Special Interest to Physicians

(A Short Resume of the Literature)

Aaron Stolinsky, M.D.

San Francisco, California

It seems probable that no science has ever enjoyed a more rapid and honorable growth, according to Strandskov,[1] in the short span of fifty years than has the science of Genetics. From scarcely more than an idea in 1900, it has blossomed into one of the most exact and most penetrating of all the biological sciences. It is true that the basic laws of genetics were discovered and reported in 1866, by the Austrian Monk, Gregor Johann Mendel, but his work remained unknown to the scientific world up to the beginning of the present century.

Genetics is the science which deals with the coming-into-being of an organism. It is one of the fundamental assumptions of modern biology, amounting almost to an axiom, that no organisms at the present time originate, *de novo*, but only from previously existing similar organisms.

The principle of the "continuity of the germinal substance" is one of the foundation principles of genetics. It shows why body changes which are produced in a parent by environmental influence are not inherited by the offspring. This is because offspring are not the product of the parent's body but only of the germinal substance which that body harbors. That acquired characters are not inherited follows as a logical necessity, if the principle of germinal continuity is sound. In qualification of these principles, it should be stated that the possibility is admitted, although not conclusively proved, that the environment may directly modify the structure of the germinal substance and thus indirectly affect inheritance, but if so, this is not accomplished through the inheritance of bodily changes, but only of germinal changes.

The gene, a conception as reasonable and as real as the atom, is to be looked upon as a particular state of organization of the chromatin at a particular point in the length of a particular chromosome. Human chromosomes are 5 to 10μ long.

Evolution is generally so slow a process, quoting freely Theodosius Dobzhansky,[2] that during the few centuries of recorded observations, man has been able to detect few evolutionary changes among animals and plants in their natural habitats. Darwin had to deduce the theory of evolution mostly from indirect evidence, for he had no means of observing the process in action. Today, however, we can study and even produce evolutionary changes at will in the laboratory. The experimental subjects of these studies are bacteria and other low forms of life which come to birth, mature, and yield a new generation within a matter of minutes or hours, instead of months or years, as in most higher beings. Like a greatly speeded-up motion picture, these observations compress into a few days evolutionary events that would take thousands of years in higher animals.

One of the most useful bacteria for this study is Escherichia coli, or colon bacteria. As we know, these organisms can easily be cultured on a nutritive broth or a nutritive agar. At about 98° F., bacterial cells placed in a fresh culture medium divide about every 20 minutes. A single cell may yield billions of progeny in a day.

Now most colon bacteria, further quoting Dobzhansky,[2] are easily killed by the antibiotic drug, streptomycin. It takes only a tiny amount of streptomycin, 25 mg. in a liter of nutrient medium, to stop the growth of the bacteria. Recently, however, the geneticist Milislav Demerec and his collaborators, at the Carnegie Institution in Cold Spring Harbor, New York, have shown that if several billion colon bacteria are placed on the streptomycin-containing medium, a few cells will survive and form colonies on the plate. The offspring of these hardy survivors are able to multiply freely on a medium containing streptomycin. A mutation has evidently taken place in the bacteria; they have now become resistant to the streptomycin that was poisonous to their sensitive ancestors.

How do bacteria acquire their resistance? Is the mutation caused by their exposure to streptomycin? Demerec has shown by experimental tests that this is not so; in any large culture a few resistant mutants appear, even when the culture has not been exposed to streptomycin. Some cells in the culture undergo mutations from sensitivity to resistance, regardless of the presence or absence of streptomycin in the medium. Demerec found that the frequency of mutation was about one per billion, i. e., one cell in a billion becomes resistant in every generation. Streptomycin does not induce the mutations; its role in the production of resistant strains is merely that of a selecting agent. When streptomycin is added to the culture, all the normal sensitive cells are killed, and only the few resistant mutants that happened to be present before the streptomycin was added, survive and reproduce. Evolutionary changes are controlled by the environment, but the control is indirect through the agency of natural or artificial selection.

Demerec has discovered the remarkable fact that about 60% of the bacterial strain derived from streptomycin-resistant mutants become dependent on streptomycin; they are unable to grow on media free from it. On the other hand, one can reverse the process and obtain strains of bacteria that can live without streptomycin from cultures predominantly dependent on the drug. If some billions of dependent bacteria are plated on nutrient media free of the drug, all dependent cells cease to multiply, and only the few mutants independent of the drug reproduce and form colonies. Demerec estimates the frequency of this "reverse" mutation at about 37 per billion cells in each generation.

Evolutionary changes of the type described in colon bacteria have been found in recent years in many other bacterial species. The increasing use of antibiotic drugs in medical practice has made such changes a matter of considerable concern in public health. As penicillin, for example, is used on a large scale against bacterial infections, the strains of bacteria that are resistant to penicillin survive and multiply, and the proba-

bility that they will infect new victims is increased. The mass application of antibiotic drugs may lead in the long run to increased incidence of cases refractory to treatment. Indications exist that this has already happened in some instances: in certain cities, penicillin-resistant gonorrhea has become more frequent than it was.

The same type of evolutionary change has also been noted in some larger organisms, according to Dobzhansky. A good example is the case of DDT and the common housefly, Musca domestica. DDT was a remarkably effective poison for houseflies when first introduced about 10 years ago. But already reports have come from places as widely separated as New Hampshire, New York, Florida, Texas, Italy and Sweden, that DDT sprays in certain localities have lost their effectiveness. What has happened, of course, is that strains of houseflies relatively resistant to DDT have become established in these localities. Man has unwittingly become an agent of a selection process which has led to evolutionary changes in housefly population. Similar changes are known to have occurred in other insects, e. g., in some orchards of California where hydrocyanic gas has long been used as a fumigant to control scale insects that prey on citrus fruits, strains of these insects that are resistant to hydrocyanic gas have been developed. That tubercle bacilli become resistant to prolonged treatment by streptomycin is well known.

Obviously, evolutionary selection can take place only if nature provides the choice of a supply of mutants. Many species of past geological epochs died out because they did not have a supply of mutants which fitted changing environments. Mutations arise from time to time in all organisms, from viruses to man.

A genetic mutation is a change,[3] presumably chemical in nature, in one of the genes which compose the chromosome thread. The mutated gene is as stable as the original; it goes on reproducing replicas of its mutated self, and thus initiates a new hereditary line. It is believed that without mutation, life would never have proceeded beyond its very first elementary beginnings, yet the mechanism of this important process is practically unknown. With the discovery by H. J. Muller that mutations can be produced artificially by x-rays, a new approach to the problem of mutation was opened up, and many new facts relating to this problem were brought to light. One of the most important results was the discovery that the term "mutation" includes a number of distinct processes. In addition to gene mutations as defined above, x-rays produce breaks in the chromosome threads; when the resulting fragments join together in novel combinations, so-called chromosome reassignments, hereditary changes closely resembling mutations, may be produced. Ultraviolet light and some chemicals like mustard gas also produce mutations.

In 1928, N. K. Koltsov published his remarkable work on The Physical-Chemical Elements of Morphology, in which he outlined the concept of the molecular organization of chromosomes. This hypothesis formed the basis for one of the chief modern trends in genetics. According to Koltsov, the basis of a chromosome is the polypeptid chain, the separate

radicals of which are genes. The most important part of this hypothesis touches upon the question of the reproduction of a chromosome. Koltsov proposed the theory of autocatalysis, according to which the chromosome does not split up, as was formerly supposed, but reproduces a double—a daughter-chromosome from the cytoplasmic substances, analogous to the growth of crystals. Koltsov's hypothesis on the autocatalytic reproduction of genes is now the most widely accepted in world scientific circles.

The frequency of any specific mutation is usually low. We have seen that in colon bacteria, a mutation to resistance to streptomycin occurs in only about one cell per billion in every generation, and the reverse mutation to independence to streptomycin is about 37 times more frequent. In Drosophila and in the corn plant, mutations have been found to range in frequency from 1 in 100,000 to one in a million per generation. In man, according to estimates by Haldane in England and James Neel in the United States, mutations that produce certain hereditary diseases, such as hemophilia and Cooley's anemia, arise in 1 in 2,500 to 1 in 100,000 sex cells in each generation. From this it may appear that man is more mutable than flies and bacteria, but it should be remembered that a generation in man takes some 25 years; in flies it takes two weeks and in bacteria, 25 minutes. The frequency of mutations per unit of time is actually greater in bacteria than in man.

The generation-time for man is about 25 years, or 40 generations in 1,000 years. Thus, there has been a long accumulation of recessive mutations, and each individual carries far more mutated genes than have arisen through mutation in his own generation.

The mutations that can be induced by x-rays, gamma-rays, or ultraviolet light in a variety of organisms, are not novel types of changes, but are similar to the mutations that occur spontaneously. The number of mutations produced is simply increased by the irradiation. Radiation-induced mutations can be identical with spontaneous mutations in an unirradiated individual. A gene mutation that has occurred spontaneously, or that has been produced by radiation, can return to the original or "wild type" spontaneously or as a result of irradiation of the progeny, although the established chance of this happening is low.

Quantitative observations, according to Evans, of the rate of induction of mutations by radiation have been made in a variety of organisms, including Drosophila, tobacco, mosaic virus, and bacteria. The results are remarkably similar. Because such widely different organisms as Drosophila, virus, and bacteria exhibit substantially the same rate of induced mutations per roentgen, it is usually assumed that about the same average numerical value per gene per roentgen, may also hold for cells in man. In man, mature sperm have a fertile span of about 7 weeks, but the relative sensitivity of sperm and eggs at various developmental stages is unknown.

Although the number of genes in a single organism is not known with precision, it is certainly in the thousands, at least in the higher organisms,

according to Dobzhansky.[2] For Drosophila, 5,000 to 12,000 seems a reasonable estimate, and for man the figure is, if anything, higher. Since most or all genes suffer mutational changes from time to time, populations of virtually every species must contain mutant variants of many genes. For example, in the human species there are variations in the skin, hair and eye colors; in the shape and distribution of hair; in the form of the head, nose and lips; in stature; in body proportions; in the chemical composition of the blood; the psychological traits, and so on. Each of these traits is influenced by several or by many genes. To be conservative, let us assume that the human species has only 1,000 genes and that each gene has only two variants. Even on this conservative basis, mendelian segregation and recombination would be capable of producing 2^{1000} different gene combinations in human beings.

The number, 2^{1000}, is easy to write but is utterly beyond comprehension. Compared with it, the total number of electrons and protons estimated by physicists to exist in the universe is negligibly small. It means that except in the case of identical twins, no two persons now living, dead, or to live in the future, are at all likely to carry the same complement of genes. Dogs, mice and flies are as individual and unrepeatable as men. The mechanism of sexual reproduction, of which the recombination of genes is a part, creates ever new genetic constitutions on a prodigious scale.

Genes are an integral part of the chromosome, arranged in linear order in it, and specific genes are associated with specific hereditary traits.[5] The ingenious work of many investigators has made it possible to map out in considerable detail the relative positions (loci) of great numbers of genes on the chromosomes of Drosophila and of corn, despite the fact that no gene has ever been seen. We also have extensive knowledge of gene interactions, as well as of the gross chemical nature of chromosomes. How a gene determines a specific hereditary character, however, is not well understood. The progress made in this field in the past several years has been remarkable. There remain, however, great gaps in our understanding of this phenomenon. The mechanism whereby genes can control specific morphological traits, i. e., the mechanism of gene action, is not well understood, and we know less still concerning the process that enables a gene to make exact replicas of itself at each cell division.

A man or woman consists of about 2^{45} cells, according to Haldane,[6] that is to say a representative cell is separated from the fertilized ovum of about 50 mitoses. The primordial ova are all formed at birth, and do not undergo further mitoses. A man may produce 2^{40} spermatozoa in a lifetime, so that the mean number of mitoses is somewhat greater in the male than in the female germ-line, but probably not over 100 in the former. Thus, a mutation rate even of the order of 10^{-4} means that the gene-copying process, at worst, goes wrong about one in a million times, whether as the result of a failure of copying, or of a change in between two copying processes. There are three possible known causes of mutation, states Haldane: a chemical reaction with a temperature coefficient,

radiation, and imperfection of copying, which might have a positive and a negative temperature coefficient. The first predominates in Drosophila, the second or third probably does so in man.

The mutation rate is probably more or less adaptive. Too high a mutation rate would flood a species with undesirable mutations; a rate too low would probably slow down evolution.

Pathologists will have to work out[6] the etiology of the different genetical types. They can hardly hope to do so until they are distinguished, if, as seems probable, each gene controls a different process. And just as the methods for the care of bacillary and amebic dysentery are very different, so it is unlikely that the same therapeutic measures will succeed against diseases, however similar in their symptoms, which are due to different genes.

In 1943 Greenhill[7] stated: "In the past, I, among others, have urged great caution with low dosage irradiation because of the reports in the literature, chiefly those of Muller, of serious harm to the offspring in the third and fourth generations in various species of animals. In human beings the offspring have been normal, but this treatment is less than 20 years old; no one knows what will happen to the third and fourth generations. However, in a personal communication William Snow writes that he calculated that, according to Muller, all life should have been destroyed by cosmic irradiation, since in a million years about 50,000 r of such energy reached the earth's surface, as judged by the Geiger-Muller readings. We must conclude, therefore, that there must be a recovery of the genes. Gordon and Sang have prevented with niacin, fruit fly mutations induced with irradiation. According to Snow, this is practical proof that the genes can recover from radiation injury."

In an editorial comment, Greenhill further said:[8] "H. J. Muller, in a talk on 'Radiation Damage of Genetic Origin' at the University of Chicago, said that important damage to the individual can result from a repetition of doses far too small to produce such obvious effects as reddening of the skin, loss of hair, changes in blood count or other signs previously used in calculating harmful effects from radioactive substances. He said that in addition to changes taking place naturally in genes, radiologic damage produces alterations in these invisible particles and that most of these changes are in some way harmful. The radiation dose received by a person during a single x-ray examination of the abdomen probably is sufficient to cause as many changes in the genes as would occur naturally in the course of the individual's reproductive life. He also said that each such dose probably carries about a 10% chance of handicapping or killing a descendant in some (usually remote) future generation. These are strong words but they show what one prominent geneticist thinks about the use of x-ray to overcome amenorrhea and sterility in women. Even if we do not agree with Muller and others, we should surely be most careful in selection of patients for such therapy."

In 1948 Greenhill made the following statement:[9] "F. Crainz made an extensive study of the literature on this subject. He found that in nearly all experimental irradiation of plants, insects and small mammalia,

it is possible to bring about true mutations, which are always of the recessive type and never result in the improvement of the race. Crainz collected from the literature 1,305 cases of pregnancy in women previously treated by gamma rays. In 1,156, 29 ended in premature delivery and 275 in abortion; 5 were ectopic pregnancies. Among 852 newborn full term babies and 23 prematurely born, abnormalities occurred in 21 (2.6%). This seems to be a large number, but in 4 cases the women were probably pregnant at the time of irradiation. The author concludes that although no one can now say with certainty that irradiation can cause hereditary anomalies in humans, it is equally impossible to deny this eventuality. Crainz warns that we must reduce to an absolute minimum all diagnostic and therapeutic x-ray or radium irradiation to the pelvic area in women still capable of becoming pregnant."

Nobel prize winner Dr. Herman J. Muller of Indiana University has recently stated: "Radiation and radioactive substances are coming to be used more and more extensively—often without adequate protection." Dr. Muller, who won fame through producing mutations in successive generations of fruit flies by the use of x-rays, is worried lest humanity succumb to the fate of his insects. X-ray-damaged genes, whether human or fly, are passed along unnoticed from generation to generation, until they meet other genes similarly defective. Then, says Muller, they produce freaks, sterility—or death.

Irresponsible use of x-rays today, Muller believes, "will be evident to some extent in the next few generations, but will be most harmful in generations hundreds of years away." A problem with a deadline in the year 3000 or 4000 A. D. may not upset many people. But, pleads Muller, we must consider "that humanity is engaged in crossing the threshold into the 'Atomic Age' in which we shall face an ever-increasing problem of protection from stray radiation and escaping radioisotopes."

Genetics, in short, teaches us also that every patient is a member of a human family whose peculiarities and potentialities are handed down from parents and grandparents to the individual in a doctor's office, or in a hospital bed. To be most effective, the doctor needs to know the family, as well as the individual. This will not make the practice of medicine any simpler, but will make it safer and even more effective than it is today.

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Technic and Clinical Value of the Frog and Toad Test

E. G. McCarthy, M.D. and L. B. Soucy, M.T.,
Plainview, Texas

Since the day of the four-day mouse test of Zondek and Ascheim, scientists have been seeking a rapid, efficient test for pregnancy. In 1923, Houssay, a South American physiologist, found that injection of the pituitary gland extract from toads injected into male toads caused the appearance of spermatozoa in the urine. Copulation in the toad effects an increase in pituitary gonadotropin and the seminiferous tubules empty into the collecting tubules of the kidney. Galli Mainini, using this evidence, found the spermatozoa in the urine of male toads, using pregnancy urine for injection into the dorsal lymph sac of the lower back. He found no false positives and calculated the test to be 99% accurate. Galli Mainini also used various hormonal products, i. e., epinephrine cortin, testosterone, estrogen and urine from menopausal women, with no false results.

Advantages

Accuracy—There have been no false positives either in our series or in any reported. We have several false negatives taken either too early or too late in pregnancy, or from patients with low gonadotropic levels (to be discussed later).

Specificity—The end point is specific. There are no "dub" readings. The spermatozoa are either present or absent. No technical skill nor microscopic sections is needed.

Rapidity—Two hours is the longest period required; 85% of positive tests are completed in 30 minutes or less.

Economy—The Amphibia are obtained free in the summer months or may be purchased for about forty cents from firms dealing in the sale of the animals. They are easily maintained and may be used repeatedly with one week's rest period.

Disadvantages

Cylic aspermatogenesis was observed by us in the frog (Rana Pipiens). Late June, July and early August is the period during which the production of spermatozoa is absent. During this period the toad was used with success. Some of the disappointing results recorded by others with use of the frog are attributable to their use during this aspermatic cycle.

DATA

Total Tests	*False Negative*	*False Positive*	*True Positive*	*True Negative*
500	11	0	3921	108

TABLE I

Results of 500 Tests with Respect to Time of Collection and Period of Gestation (September 14, 1948 to November 20, 1949)

Gestation	*Morning Specimens*				*Random Specimens*
	3 weeks to 6 months	*less than 3 weeks*	*7 to 9* months*	*not known*	
Number of Tests	260	13	35	90	102
Percent Accuracy	100%	85%	93%	98%	93%†

*Aschheim and Zondek declared their mouse test to be of no value after the 5th month of gestation because of the drop in gonadotropic titer. We had 3 negatives in known pregnant women at 7th and 9th month.

†It was interesting to note that in 4 of these false negative random urines, subsequent first morning specimens were positive but the women later aborted. This supports the findings of Venning who found that a low gonadotropic titer often accompanied abortion.

Table II

Comparisons of Rabbit and Frog Tests

	Number of Tests	*True Positive*	*True Negative*	*False Positive*	*False Negative*
Frog.....	100	72	26	0	2
Rabbit....	100	69	23	3*	2

*One case of fibromyoma gave false positive on rabbit, testing true negative on frog. Testing proved by operation.
Two menopausal cases.

TABLE III

Showing Time Negative Test is Obtained After Placental Separation

	Pre-op. Test	*6 hrs. Postop.*	*12 hrs. Postop.*	*24 hrs. Postop.*
Case I.....	Positive	Positive	Negative	Negative
Case II.....	Positive	Positive	Negative	Negative
Case III.....	Positive	Positive	Negative	Negative
Case IV.....	Positive	Positive	Positive	Negative

Four cases of therapeutic abortion were used for this information. The value of the frog test in determining the time to interfere in a bleeding abortion is obvious. The long-time interval for other tests except the two-hour rat test precludes their use in these cases.

TABLE IV

Follow-Up in Three Cases of Hydatidiform Mole with Dilutions of Urine

(No spinal fluid tests were done)

	Dilutions				
	1:1	*1:2.5*	*1:5*	*1:10*	*1:20*
Case I	Positive	Positive	Negative	Negative	Negative
Case II	Positive	Positive	Positive	Negative	Negative
Case III*	Positive	Positive	Positive	Positive	Negative

*Case III was that of a nurse who had her second hydatidiform mole in three years. Between these pregnancies she had a full gestation (baby died after gastroenterostomy for duodenal atresia) and she suffered a ruptured uterus 18 hours postpartum, followed by repair of uterus and recovery. With this pregnancy bleeding began at 8 weeks' gestation and laparotomy was decided on. The uterus showed the healed scar of the old rupture and an impending rupture covered only by serosa. No villi were found in the degenerated area. Excess of cytolitic enzyme produced by the overactive trophoblastic elements of the mole was thought to be responsible for the invasion of the uterine wall. The value of this test in eliminating the possibility of chorioepithelioma may be seen.

TABLE V

Comparison of Sensitivity of Various Test Animals Using Pooled Urines from Women Approximately 2½ Months Pregnant*

	Dilutions				
	1:25	*1:30*	*1:35*	*1:40*	*1:50*
Frog.....	Positive	Positive	Positive	Positive	Positive
Rabbit....	Positive	Positive	Positive	Doubtful	Negative
Mouse....	Positive	Positive	Positive	Negative	Negative
Rat.....	Positive?	Positive †			

*Highest gonadotropic titer time.

†Lack of specificity by either gross or microscopic examination precluded further observations. Outside pathologic laboratory reported on rat and mouse microscopic tests.

Some Clinical Applications of the Test

1. Early gestation.
2. Ectopic gestation.
3. In fibromyomata uteri before surgery is contemplated.
4. Before plastic or suspension operations.
5. In following a hydatidiform mole to eliminate the possibility of chorioepithelioma.
6. To determine the time for interference in abortions.
7. Possibly in suspecting and directing therapy in threatened or impending threatened abortion. The Johns Hopkins Group (self et al) urged the use of chorionic gonadotropin early in gestation to ward off abortion.
8. Fetal death—Zondek and others reported a method of using decreasing dilutions of urine injected into mice to determine fetal death or impending death. The use of frogs with greater rapidity and more accuracy may be used in this condition.

Cases Which Showed True Negative Tests

	No. of cases	*Reaction*
Granulosa Cell Carcinoma	1	Negative
Psychogenic Amenorrhea	6	Negative
True Psychoses	2	Negative
Fibromyomata	8	Negative
Menopause	6	Negative
Endometrial Hyperplasia	4	Negative

Fetal salvage in cases of impending abortion—2 patients carried past the 5th month and appear normal after a negative frog test. The total was 12 cases. Some showed a positive frog test on admission. Most were negative later before the actual abortion. Two were positive a short time, 4 to 6 hours, after abortion.

The clinical value of the test may be shown by a few illustrative cases. The first is a case of sterility of seven years' duration. The patient had a uterosalpingography with evidence of occluded tubes one month previously. She had always been irregular in her menstrual periods. She decided on tubal plastic surgery and was admitted to the hospital, when it was discovered that her frog test was positive. She delivered a premature infant later. The second case was a 38-year-old woman with a diagnosis of large fibromyomata of the uterus. A rabbit test done by a competent

laboratory showed positive. Our frog test was negative. Later a second rabbit test was doubtful and the frog test was again negative. Subsequent operation revealed no evidence of pregnancy. Another case was that of a nurse of our institution who had had a hydatidiform mole in 1946. She had a normal pregnancy in 1948 with delivery of an infant (later died after surgery for duodenal atresia), and rupture of the uterus postpartum. Laparotomy was done with hasty repair of the rupture site and three months ago she was found to be pregnant by the frog test in high dilution. No hydatidiform mole was suspected but she was bleeding and a laparotomy was deemed advisable. Another hydatidiform mole with another impending at the site of the rupture of the uterus was found. No spinal fluid hormone test had been done or would have forewarned of the second mole.

SUMMARY

A short, accurate, economical and specific test for pregnancy is presented. The clinical applications are discussed and comparisons with other test animals are presented in tabulated form. The disadvantages of this test and possible pitfalls are also discussed.

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Case Histories of Malpractice Actions against Physicians

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The case books show a large number of cases against physicians who are charged with malpractice in that they used the wrong method of treatment, or did not exercise the best method, or who, in their treatment, fell below the proper standard of intelligence and medical knowledge.

Very few of these cases resulted in verdicts against the physician-defendant, but their very large number has resulted in a declaration by courts which really amounts to a kind of formula by which the conduct of a physician under suit is to be judged. That formula can be stated thus:

The standard by which the degree of care, skill, and diligence required by physicians is to be determined, is not the highest order of qualification obtainable, but is the care, skill, and diligence which are ordinarily possessed by the average of the members of the profession in good standing. It is the skill and diligence ordinarily exercised in his profession by the physician in the same general neighborhood, and in the same line of practice.

Waiver of Professional Communications Privilege

The fact that the plaintiff, in an action to recover disability benefits under certain life insurance policies and for reinstatement as to other policies, alleged in his complaint that he was then afflicted with a heart ailment (which condition was the foundation of his cause of action) was not a waiver of the privilege afforded by Section 352, New York Civil Practice Act. If disclosure should be made at the trial by plaintiff the defendant may apply, in the light of such waiver, for suspension for a reasonable length of time within which to examine and produce physicians who attended him and hospitals in which he was maintained, in respect of that ailment.

So holding, the New York Appellate Division, Rubin vs. Equitable Life Assur. Soc., 269 App. Div. 577, 53 N. Y. S. 2d 351, modified an order of the trial court granting the defendant's motion for an examination before trial of three physicians and a hospital, by striking out the subject matter of the examinations, the direction for production of records and the reservation to the plaintiff of any objection based upon physicians privilege to be passed upon at the time of the examination, and by substituting in lieu thereof, as to the subject matter of the examination of the physician, the time or times that they attended plaintiff professionally, together with dates and duration, and whether plaintiff was sick at such time or times,

and as to the hospital, date of entry or entries of plaintiff therein, duration of his stay or stays and dates of his discharge or discharges. Production of pertinent records was also directed. Clarifying this somewhat, it means that a general practitioner specializing in nothing, and doing what might be called a general average practice, is not held to as much knowledge as a specialist, or as an eminent city physician with closer contact with sources of knowledge and much wider experience.

A case before me (23 Pa. Super. 213) furnishes an interesting illustration. A general practitioner was sued for damages on the charge of alleged careless, unskillful, negligent and improper treatment of a disease of the eyes. He had long been the patient's family physician and appears to have been an average man in that class practicing for twenty-eight years. The patient's symptoms were febrile, severe pains in the head and body, inflamed and swollen eyes, sensitive to light and very painful. The physician, after examination, believing that he had a case of conjunctivitis, prescribed local cold applications and certain medicines to alleviate pain. None of this did any good and the patient soon became blind. Later several specialists examined him and pronounced his disease chronic glaucoma, which the attending physician, after ten visits, had completely mistaken.

Suit was brought on the ground of negligence, both in diagnosis and treatment. The defendant's defense, briefly, was this: Glaucoma is a rare disease, the general practitioner seldom sees it, and if he does, could not be depended on to diagnose it accurately. The instrument used in proper diagnosis (an ophthalmoscope) is rarely in a general practitioner's equipment, and only a specialist understands it. The symptoms of glaucoma are frequently confused with cataract, iritis, keratitis and conjunctivitis and the physician was therefore justified in diagnosing the condition as conjunctivitis; he was not a specialist and used the best knowledge he had.

The defense was supported by many medical witnesses, but so far as the jury was concerned, was unsuccessful. They rendered a verdict against the physician for $1,500, which was later reduced by the trial court to $500, and finally taken away entirely by the appeal court, which used the formula I recited above in the holding of the defendant-physician not liable at all.

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